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# The Lukens System of Orthodontia Appliances









# The Lukens System of Orthodontia Appliances

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By C. D. LUKENS, D. D. S.

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S E C O N D E D I T I O N

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# ORTHODONTIA

## A System of Correcting Mal-Occlusion of the Teeth by the Use of a Limited Number of Efficient Appliances

There has been a constant and pressing demand during the past few years by the dental profession for more simple, efficient and systematic methods of correcting irregularities of the teeth. The old methods of inventing and constructing appliances for each case were found to present so many difficulties, such as securing proper material and tools, immense amount of time consumed in their construction, application and operation, together with great inconvenience and suffering of the patient, that many were led to abandon this important branch of dental science.

With the introduction of ready-made appliances these difficulties began to be overcome, and new interest was awakened in Orthodontia. Improvements in appliances have been constant, with a tendency towards simplicity of mechanical principles and the reduction of parts.

The appliances here illustrated offer to the profession a system that covers the widest possible range of cases with the minimum of working parts and the greatest ease of manipulation. They are made of the finest quality of nickel silver, beautifully finished with a triple hand-burnished gold plate.

### SOLDERING

For the uniting of plain bands, the soldering of spurs, or where it is desirable to make any soldered connection, silver solder will be found the most desirable medium for the purpose, using borax for flux. However, when it is desirable to solder a small spur or lug upon the expansion arch C, jewelers' soft or lead solder should be used, as the amount of heat required for fusing is so slight that it has no deleterious effect upon either the temper or the plating of the arch. Phosphoric acid, as it is furnished for cement liquid, is the best flux for this purpose, as it produces no oxidation.

The fine flame of the Herpath blow pipe (Fig. 1) will be found most desirable for these soldering operations. A small piece of well boraxed silver solder should first be fused upon the end of the spur wire A. By holding the band with a small pair of soldering pliers the spur wire can be attached at any indicated position after which it can be cut off to the desired length and finished with the file. By confining the needle point of the flame to the desired point of attachment a spur can be soldered almost in contact with the soldered seam of the band without its being detached.



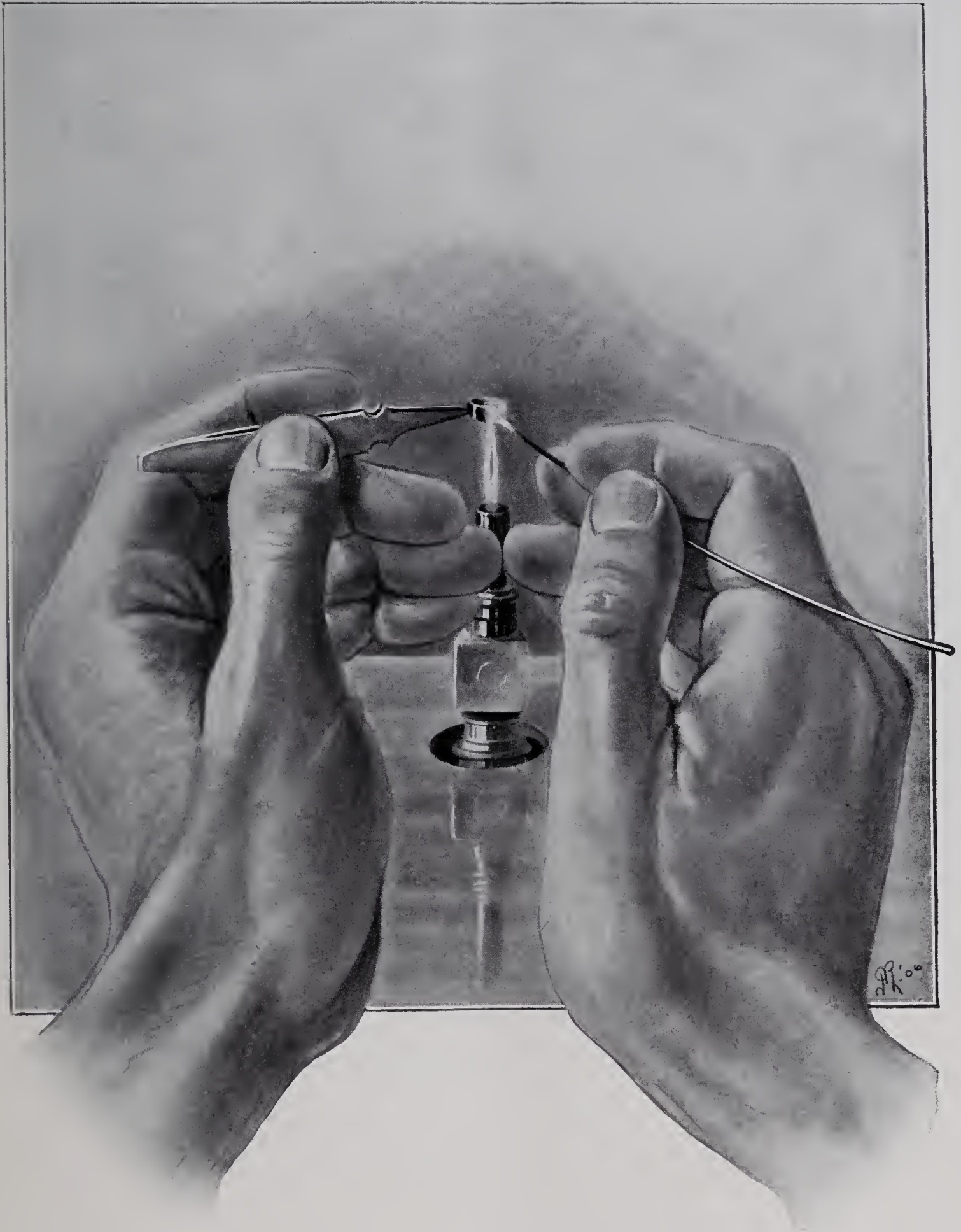


FIG. 1

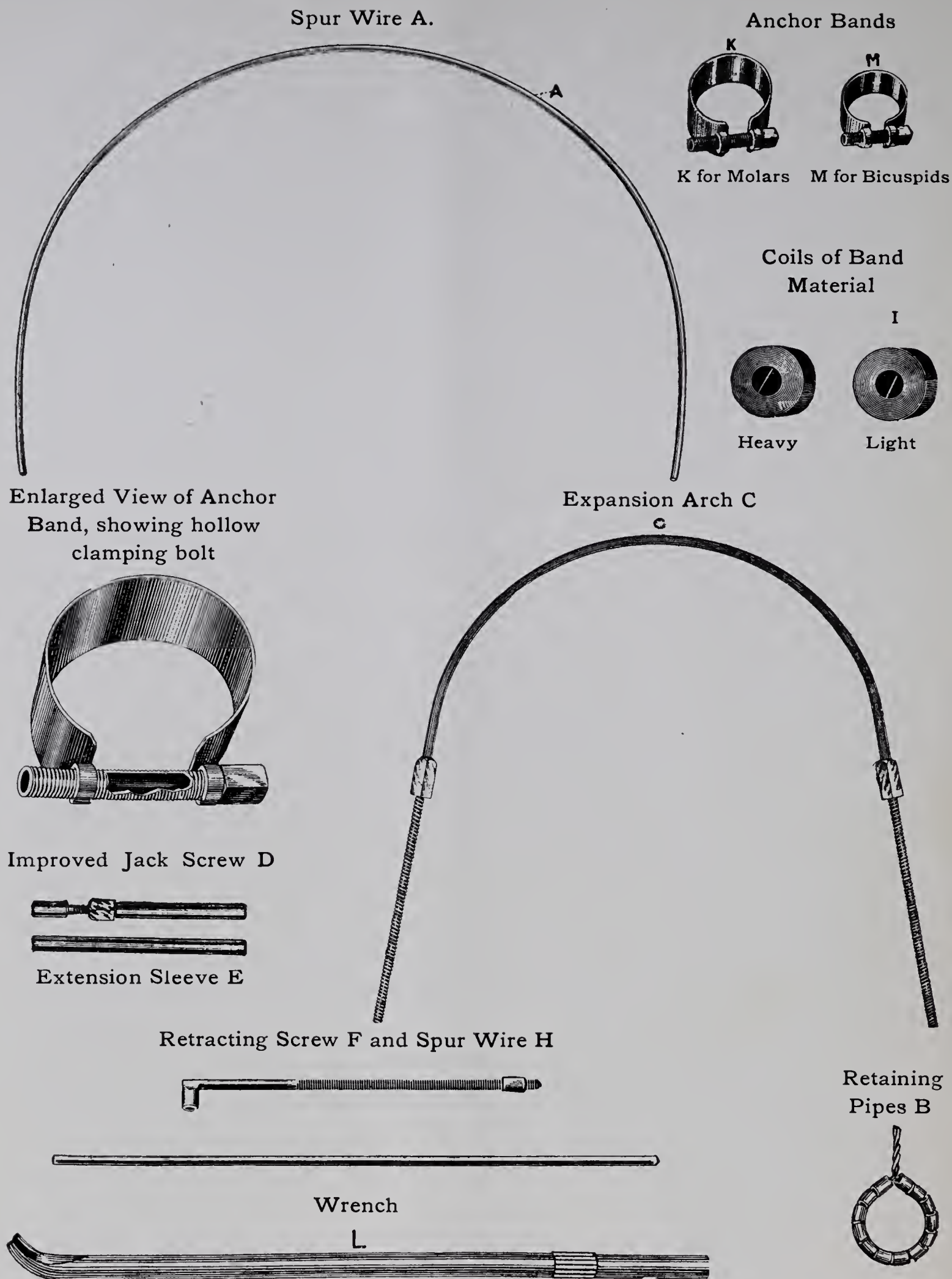


FIG. 2

The letters used to designate the parts of the appliances as given in the above illustrations will be used in the description of their various combinations and in their application to cases of different types.



## GENERAL DESCRIPTION OF PARTS

### Anchor Bands K and M—Fig. 2

Anchor bands K and M for molars and bicuspid respectively illustrate a most marked improvement in clamp band construction and possess many valuable features which will be described fully as their combination with other parts are considered.

### Jack Screw D and E—Fig. 2

D illustrates the improved double tubular end Jack Screw, and E an extra long sheath for use where it is desirable to span a greater space than can be covered with the short sheath. The great advantage of this Jack Screw is to be found in the fact that it can be swung from short spurs soldered to bands and will not readily become dislodged upon the relinquishing of the pressure due to tooth movement.

### Band Material I and J—Fig. 2

This band material is furnished in two thicknesses, J being the heavier and best adapted for general use, while I is lighter and well adapted for retention and similar purposes. It is highly polished and thoroughly annealed, thus eliminating the necessity of annealing in the coil, which has the disadvantage of uncertainty, and oxidizing the metal to such an extent that soldering is accomplished with the greatest difficulty.

### Retracting Screw F and H—Fig. 2

The improved tubular end retracting screw F possesses the quality of lightness combined with great strength. Another great advantage in its favor is the fact that it can be placed in position in combination with the anchor band K without a soldered connection, thus greatly relieving the operator. H is a heavy spur wire for making the attachment to the band on the moving tooth.

### Retaining Pipes B—Fig. 2

These are small light tubes cut in assorted lengths and are most valuable for assisting in retention and making various connections and attachments.

### Spur Wire A—Fig. 2

Is a length of annealed nickel silver wire drawn to perfectly fit the retaining pipes B, and is used for making spurs upon which fit the tubular ends of the Jack Screw D, also for making ligature attachments to bands, and is a valuable adjunct in combination with band material I and J in securing retention.

### Expansion Arch C—Fig. 2

This arch is made of the finest quality nickel silver. A most decided advantage will be found in the high spring temper it possesses. The threads are of a special cut and number, and the nuts are long and accurately fitted, all of which combine to make it a perfect appliance. Its range of application is very great, in fact, almost universal.

### Wrench L—Fig. 2

This wrench is made to fit all the nuts used on these appliances as well as the clamping bolts of the Anchor Bands K and M.

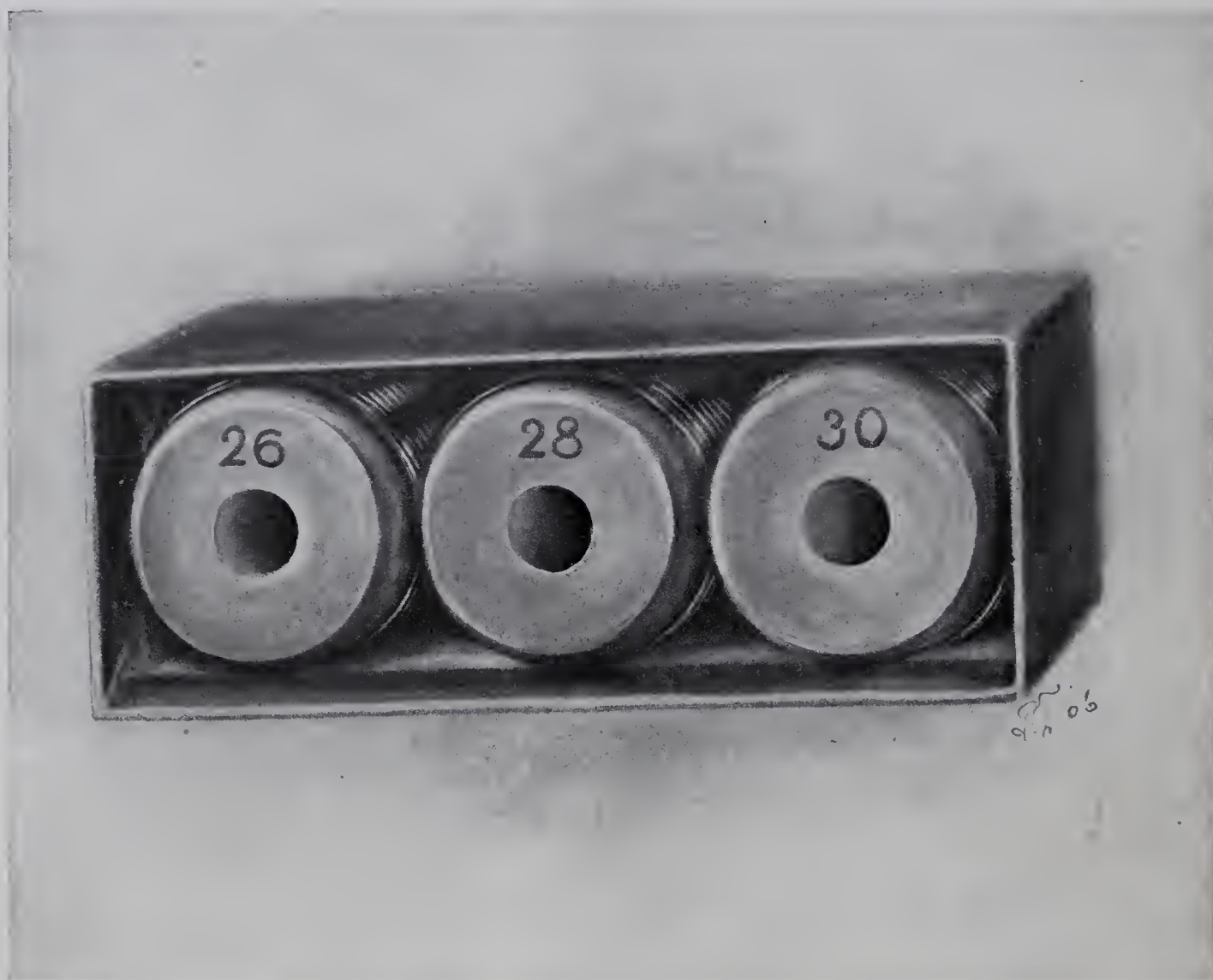


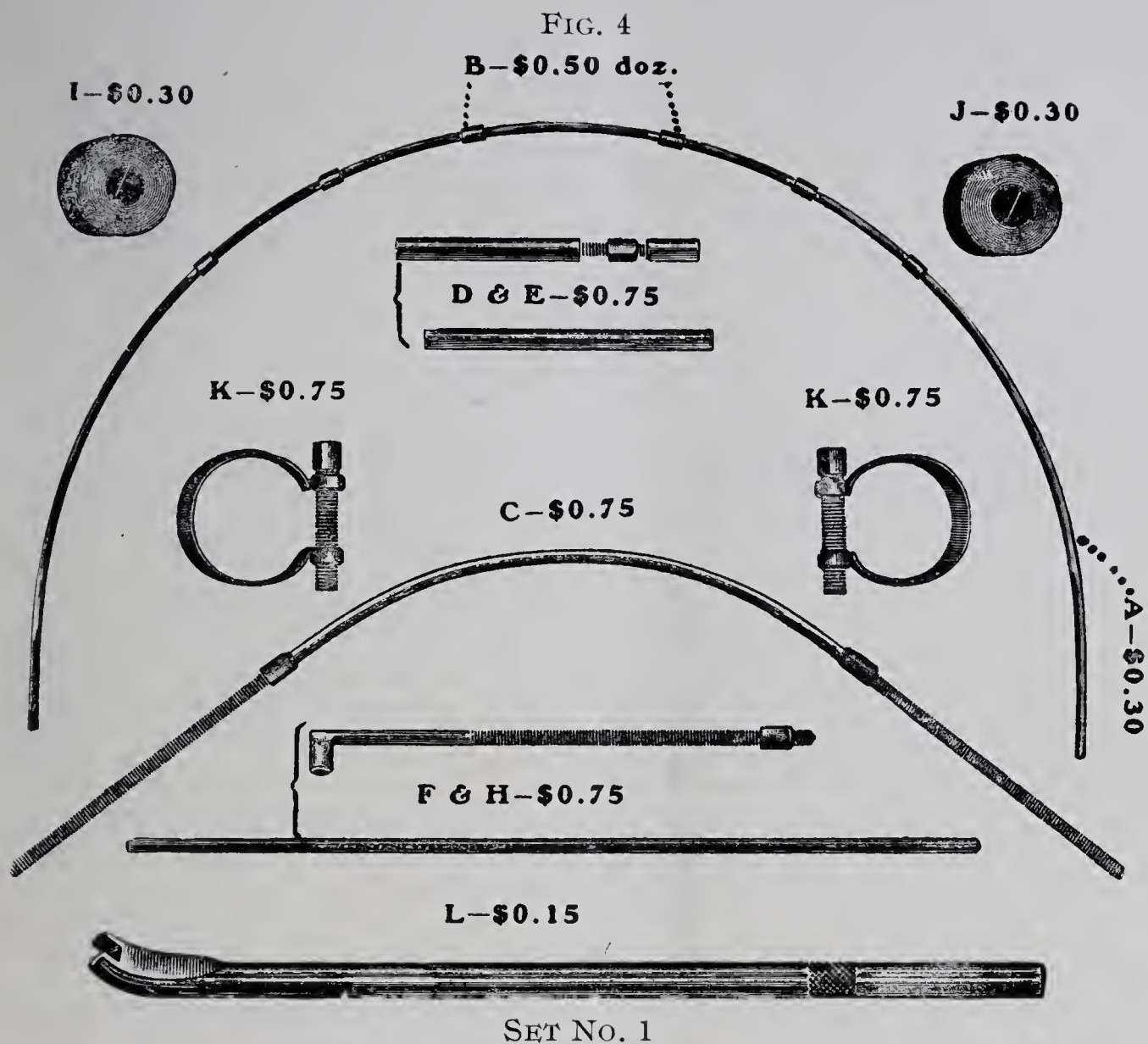
FIG. 3

### Elastic Bronze Ligature Wire

This ligature wire is especially prepared for orthodontia ligatures from the finest quality of aluminum bronze. It is very supple, highly resistant to oxidation and possesses a peculiar quality of elasticity, all of which combine to make it the ideal ligature.

Prepared in three gauges, 26, 28, 30. Price, \$1.00. Per spool, 35 cents.

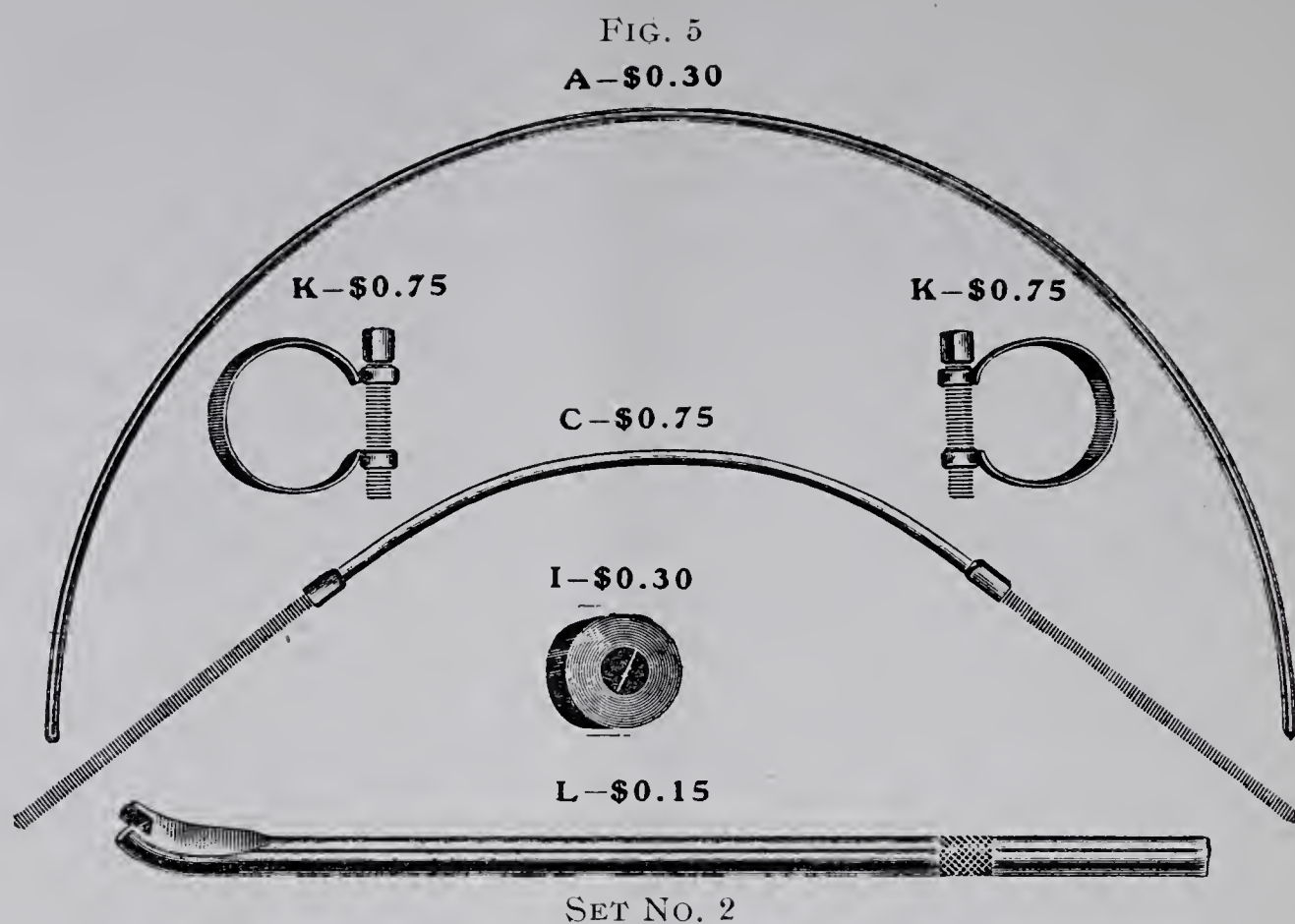




### DESCRIPTION OF SETS Nos. 1 and 2.

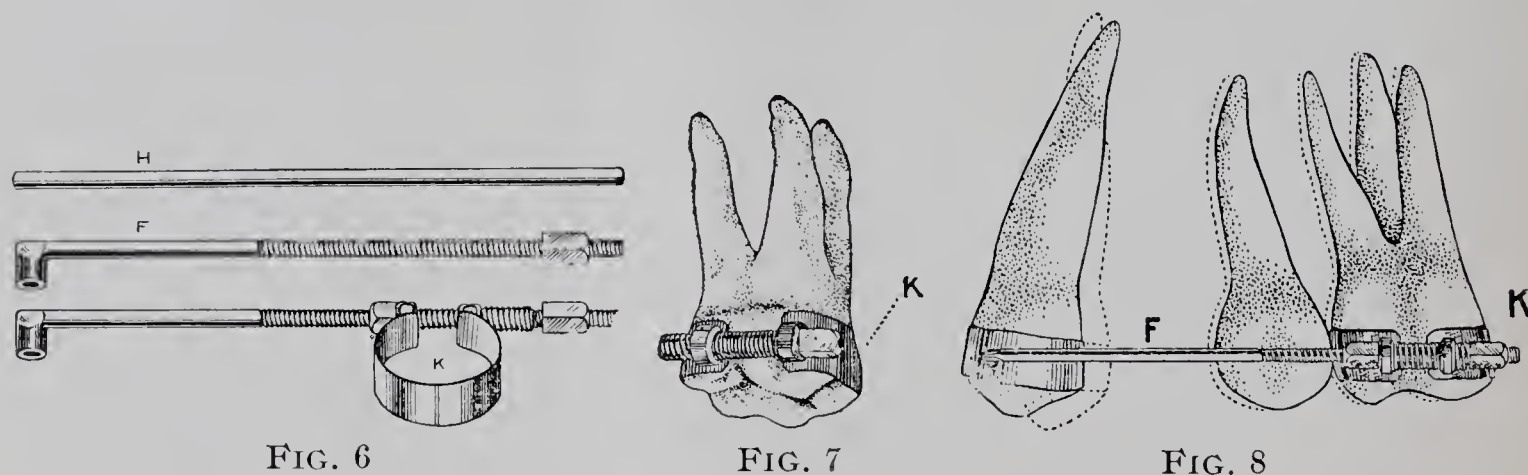
The individual parts of the appliances just described have been arranged into two sets.

Set No. 1, Fig. 4, consists of two molar anchor bands K, one expansion arch C, one coil of heavy band material J, one coil of light band material I, one jack screw D & E, one retracting screw F & H, one spur wire A with six pipes B to fit the same, and one wrench L.



Set No. 2, Fig. 5, contains two molar anchor bands K, one expansion arch C, one coil of heavy band material J, one spur wire A, and one wrench L. This latter combination of parts has constantly grown in popularity since its introduction, owing to the fact that all the parts contained in this set are necessary for the correction of so large a percentage of cases, whereas, in selecting a set of larger assortment, extra parts often remain unused; for this reason it is advisable to select just the parts needed for each individual case rather than to select by sets, except in those cases where just the number of parts contained in either the No. 1 or No. 2 sets are required.

### COMBINATION OF THE RETRACTING SCREW WITH ANCHOR BAND



In combining the retracting screw F and the molar anchor band, K (Fig. 6) for the retraction of the cuspid teeth, the first essential is the proper fitting of the anchor band K to the first molar (Fig. 7).



This should be accomplished by first loosening the screw and then forming the anchor band K to the shape of the tooth, approximately, with a pair of flat nose pliers; the band should then be placed on the tooth with the hollow clamping bolt on the buccal surface and the square or wrench end of the bolt toward the mesial; the band should then be gently forced upon the tooth. With a moderate amount of time and care this can be accomplished in almost every instance without resorting to mechanical separation of any kind. Placing one end of the wrench or a piece of orange wood across the edge of the band will greatly protect the fingers as well as render an equal distribution of force in carrying the band to the desired position. The hollow clamping bolt should then be tightened and the band burnished to conform to the irregular surface of the tooth, alternating the operation of tightening and burnishing until the band is firmly fixed. A narrow margin of the band should be burnished over the mesial and distal marginal ridges to prevent the band being carried too far toward the neck of the tooth.

The advantages of this band are manifold; there is no nut and bolt on the lingual surface to irritate or interfere with the tongue; the clamping bolt is easily reached with the wrench, and the difficulty of soldering and aligning a tube on the buccal surface for the reception of the retracting screw is entirely eliminated (Fig. 8).

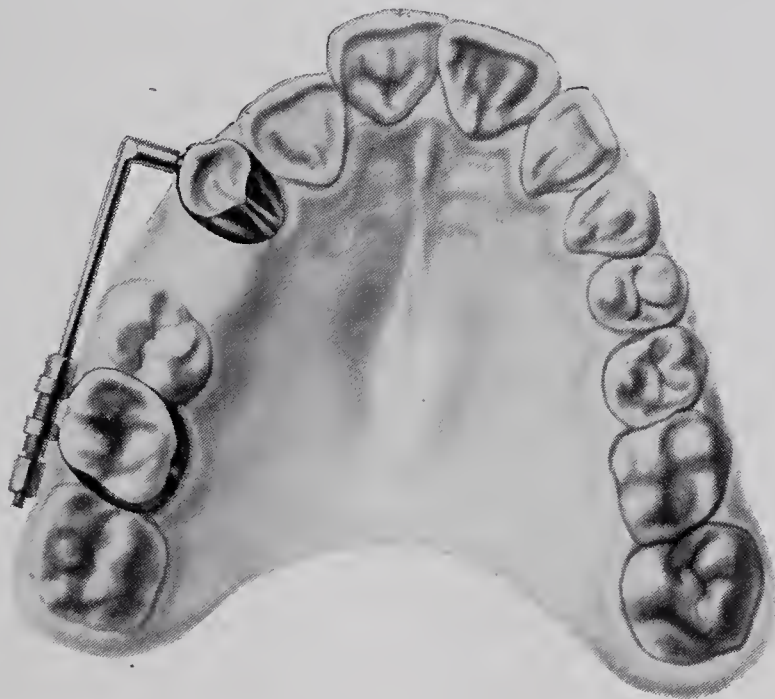


FIG. 9

In making the application of the anchor band K and the retracting screw F for the retraction of the cuspid tooth (Fig. 9) the first procedure is the fitting of band K to the first molar in the manner just described; then make a band of the heavy band material J to fit the cuspid. On the labial surface of this band solder a short spur of the spur wire H at right angles to the long axis of the tooth.

It is well to allow these bands to remain in place for about twenty-four hours to secure separation of the teeth so they can be easily slipped on and off while cementing.

The cuspid band should now be cemented firmly in position. Remove the band K and place the retracting screw F through the hollow clamping bolt, placing the nut in such position that it will rest against the distal end of the clamping bolt. Cut off with the cutting pliers, or file any excess of the retracting screw that may project sufficiently beyond the nut to irritate the cheek. Carefully dry the first molar, fill the band K with cement, place the tubular end of the retracting screw over the spur H on the cuspid band and carry the band K into position, quickly tightening the clamping bolt while the cement is still soft.

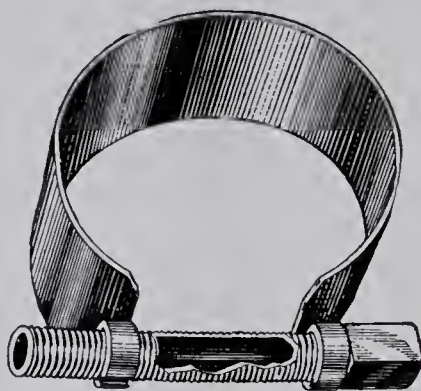


FIG. 10

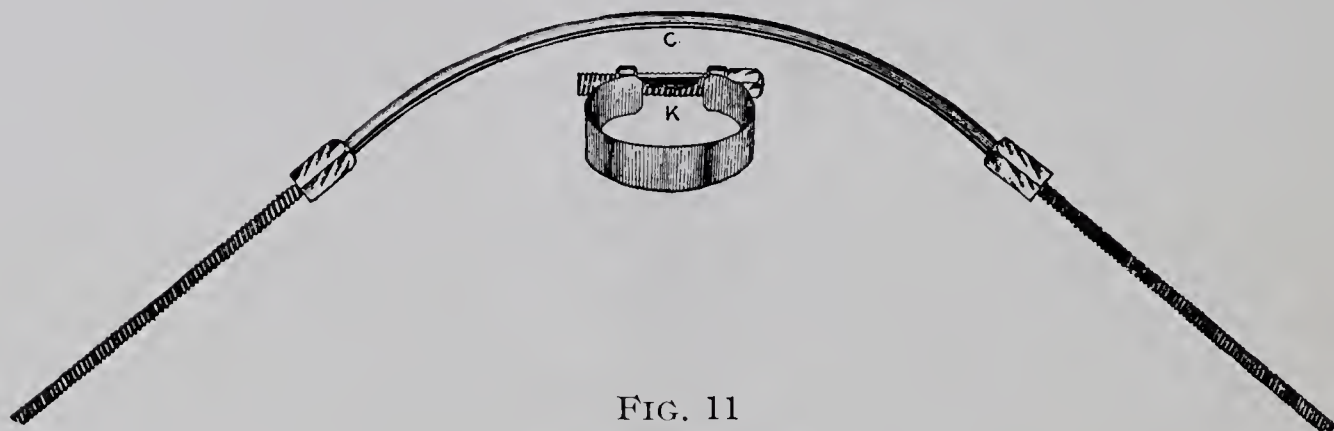


FIG. 11

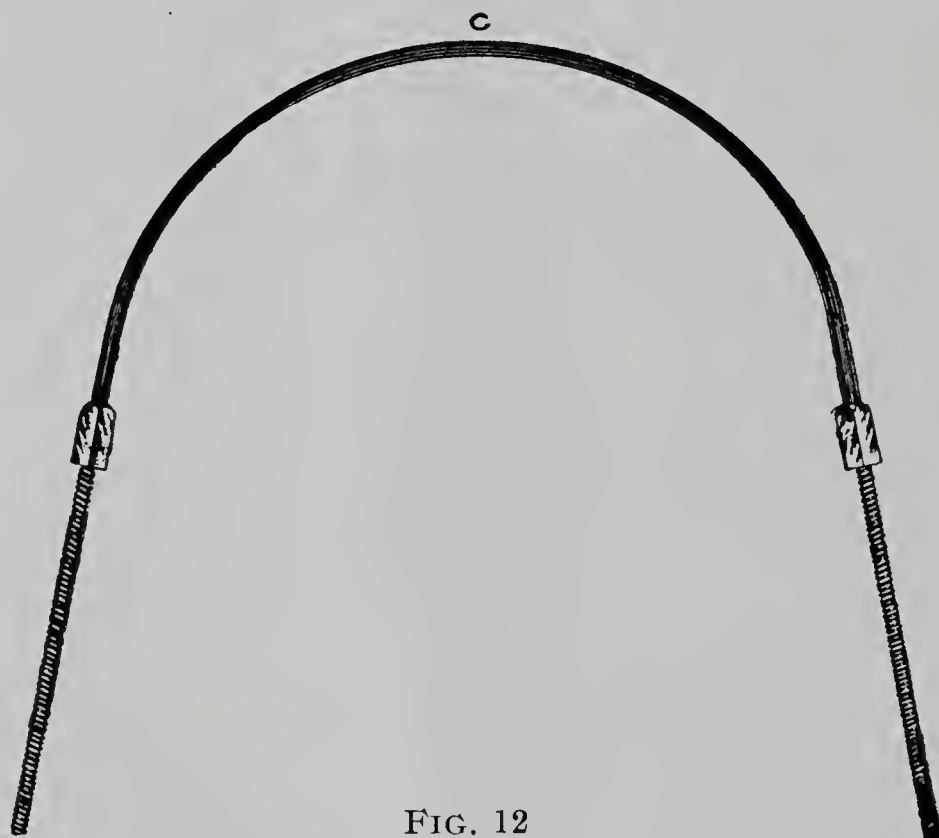


FIG. 12





FIG. 13

### COMBINATION OF ANCHOR BANDS AND EXPANSION ARCH

The combination of the anchor bands K and expansion arch C is almost universal in its application. Fig. 10 shows an enlarged view of the anchor band K. Fig. 11, the expansion arch C bent to such a curve as to give the greatest possible lateral expansion. While Figs. 12 and 13 show it bent to such a curve as would be desirable where less lateral expansion of the molars is required.



FIG. 14

Fig. 14 illustrates the application of this combination for the simultaneous expansion of both upper and lower arches, which is very desirable, as it allows the placing of the teeth of one arch in their proper relation with the teeth of the opposing arch, and also greatly reduces the time of treatment. It is well to place the upper arch in position first and allow about two weeks to elapse before placing the lower, especially in cases where anterior expansion is required, as this prevents the cutting edges of the lower incisors from bearing heavily upon the lingual surface of the upper.

Figs. 15 and 16 show the application in detail of the case illustrated in Fig. 14. Fig. 15 shows an occlusal view of the upper arch.

To adjust these appliances place the anchor bands K on each of the first molars, after which make plain bands of the heavy band material J to fit the right lateral and left central incisors. On the mesio-lingual angle of each of these bands solder a short spur of the spur wire A and cement the bands in position.

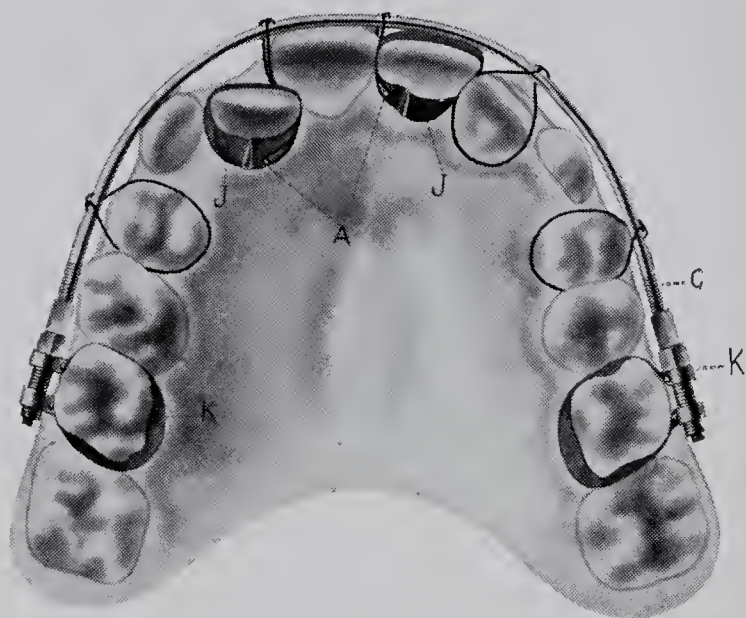


FIG. 15

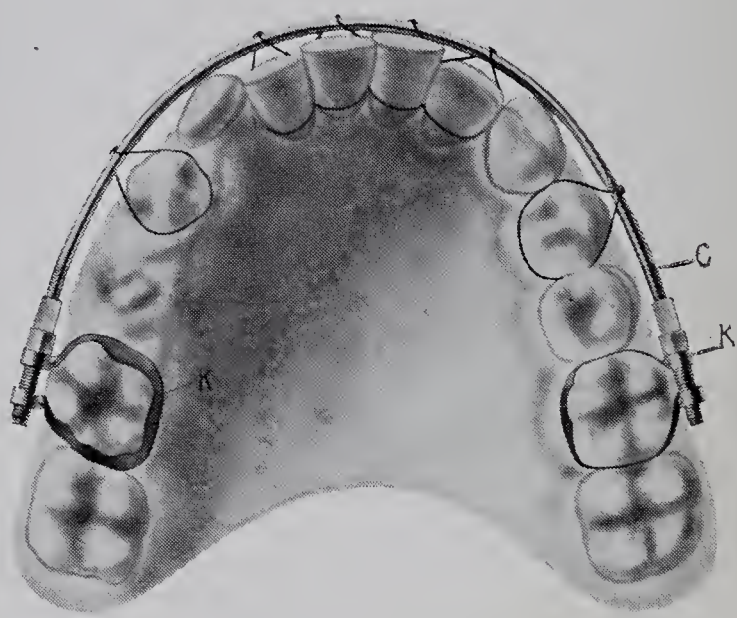


FIG. 16

As in the case of the bands for the retracting screw, it is desirable to allow them to remain in place for about twenty-four hours before cementing, for the purpose of securing sufficient separation to permit easy removal and affording better opportunity for drying between the teeth, preparatory to cementing them in place. The expansion arch C should then be carefully bent to conform to the dental arch, care being taken not to allow excessive lateral spring, unless greater width in the molar region is desired. The arch should then be placed in position with the nuts resting against the mesial end of the hollow clamping bolts of the anchor bands K, and any excess of the arch that projects beyond the distal end of the clamping bolts cut off and the ends rounded.



To accomplish lateral expansion of the bicuspid, lace them to the expansion arch C, using for the purpose elastic bronze wire ligatures. To expand in the anterior region, loop the ligatures over the spurs A on the bands J and lace to the arch. This will rotate the central and lateral incisors at the same time they are being carried forward into their proper alignment. If it is desirable to move one tooth more rapidly than the others, as in the case of the lateral incisor, this can be accomplished by more repeated lacing, while collective movement of the anterior teeth can be readily accomplished by tightening the nuts of the expansion arch C against the mesial end of the anchor band K.

Fig. 16 shows the occlusal view of the lower arch in Fig. 14.

As expansion alone is here required without the rotation of any teeth, it is only necessary to place the anchor bands K on the first molars and after forming the expansion arch C to its proper

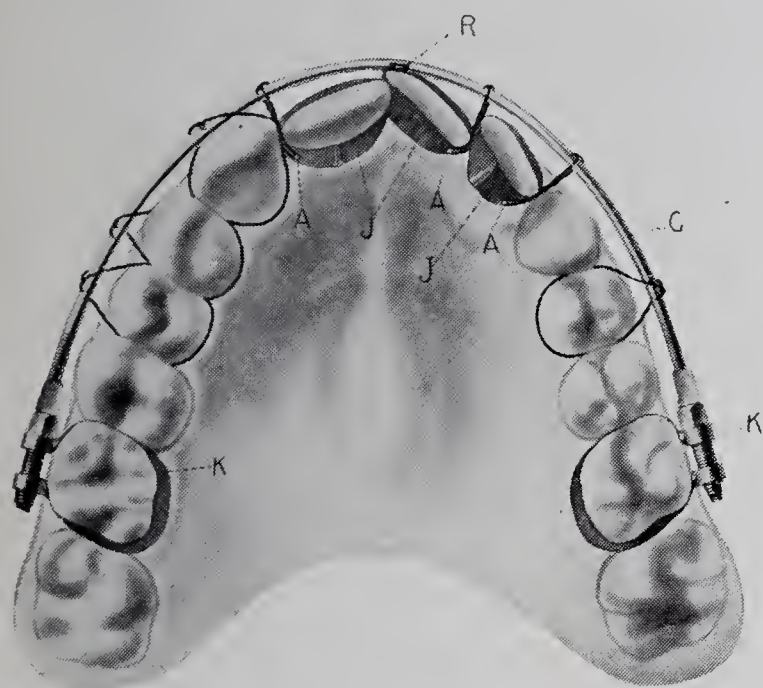


FIG. 17

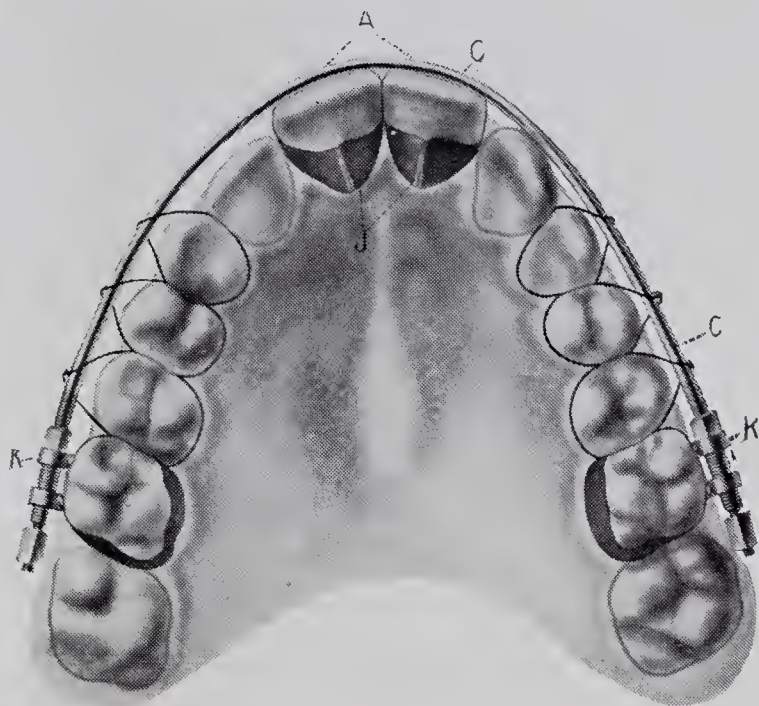


FIG. 18

shape, place it in position and lace the incisors and bicuspid, thereby enlarging the dental arch in every direction, so as to harmonize in size and shape with the upper. These various appliances should be placed in the mouth gradually, allowing some time between the introduction of each part. By so doing, the inconvenience to the patient will be reduced to the minimum.

Fig. 17 illustrates a case where greater lateral expansion is required to provide sufficient space to rotate the two central and left lateral incisor into their proper position. The anchor bands K are first placed upon each of the first molars, plain bands of the heavy band material J are then placed upon both central incisors and left lateral, with short spurs of the spur wire A soldered upon the disto-lingual angle of each.

The expansion arch C is then placed in position with the nuts

resting against the mesial end of the hollow clamping bolts of the bands K. The various teeth are then laced to the expansion arch C in the manner previously described, using the spurs on the incisor bands for attaching the ligatures, which brings all the pressure to bear on one side of the tooth, so it will be rotated at the same time it is being carried forward.

This rotation will be greatly facilitated by placing a rubber wedge R between the arch C and the mesio-labial angle of the left central incisor.

Sufficient space should be provided for these teeth by lateral expansion before rotation is attempted.

Fig. 18 illustrates a case where it is desirable to modify the shape of the dental arch by widening the lateral halves and depressing the central incisors.

The anchor bands K are placed on the first molars, while plain bands of the heavy band material J are made for the central incisors.

To these bands, solder short spurs of the spur wire A on the labial surface at right angles to the long axis of the teeth. The expansion arch C is then placed in position with the nuts resting against the distal end of the hollow clamping bolts of the bands K. The spurs A on the incisor bands will prevent the arch C from being carried toward the gingival line when these nuts are tightened to depress the central incisors.

The lateral halves of the arch are widened at the same time by lacing the cuspids and bicuspid to the arch C.

To eliminate the difficulty often experienced in placing the arch nuts against the distal ends of the anchor bolts, it is best, after bands are fitted and the arch adjusted, to remove the bands K, place them on the arch C, and screw the arch nuts into position; then return the combined parts to the mouth.





FIG. 19

Fig. 19 illustrates a case requiring the movement of all the teeth in the upper arch anterior to the first permanent molars. The anchor bands K are adjusted to the first molars, and plain bands of the heavy band metal J are made to fit the lateral incisors; on the disto-lingual angle of these plain bands are soldered short spurs of the spur wire A. The expansion arch C is then made to conform in a general way to the shape of the dental arch and placed in position. The central incisors, the first and second bicuspids on each side and the lateral incisors are now laced to the expansion arch C with elastic bronze ligature wire. In the case of the lateral incisors the short spur on the disto-lingual angles of the bands are used to engage the ligatures for the purpose of accomplishing the rotation of these teeth. The small rubber wedges placed between the expansion arch and the cuspid teeth greatly facilitate their lingual movement.

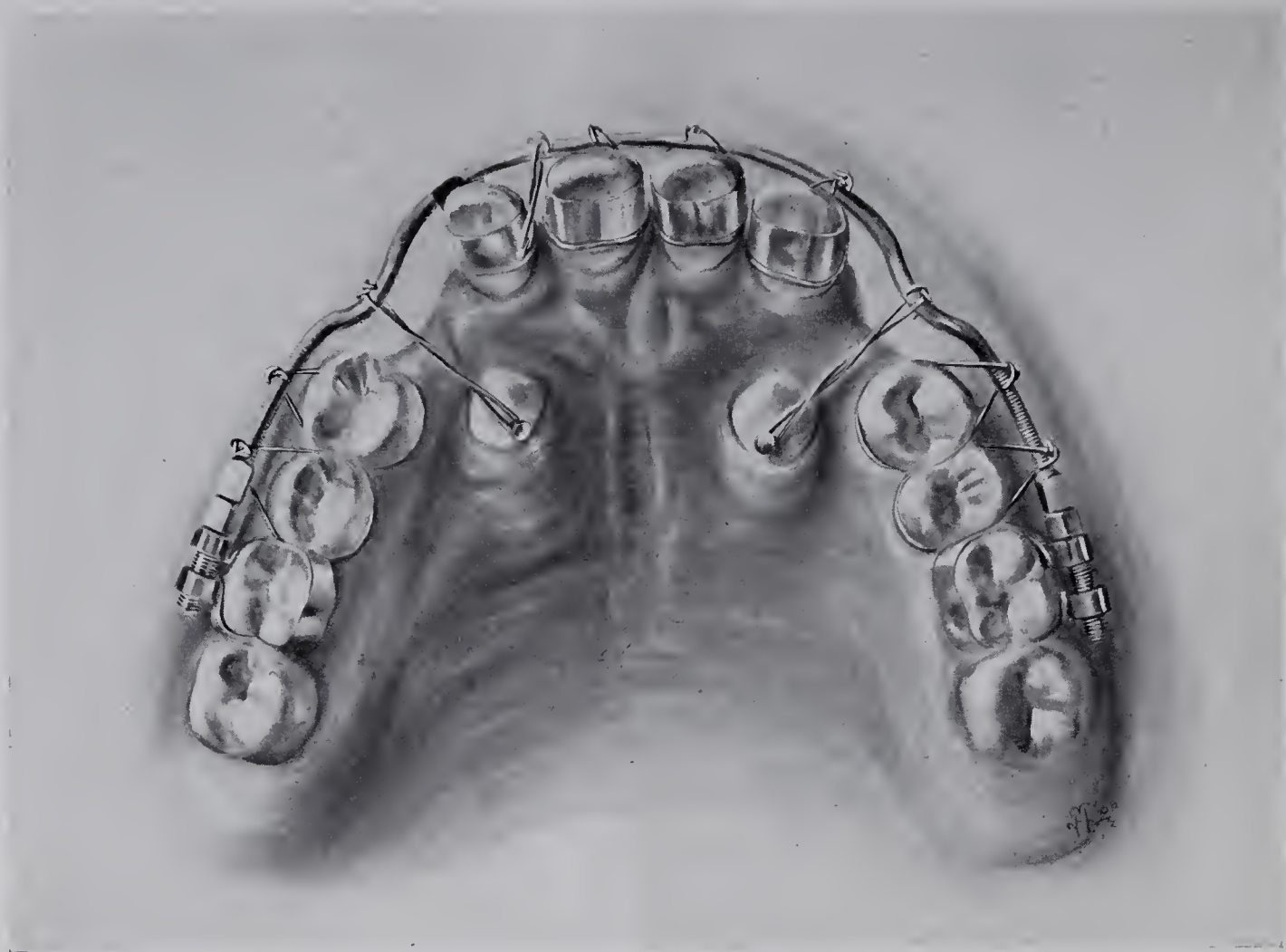


FIG. 20

Fig. 20 shows a case where the cuspids are erupting greatly to the lingual of their normal position and illustrates the application of the molar anchor bands K and expansion arch C for the correction of the condition. The anterior and lateral portions of the arch are expanded by lacing the incisors and bicuspids to the expansion arch C for the production of sufficient space to bring the cuspids into the line of occlusion. Pins accurately fitted and cemented into the lingual surface of the cuspids forms the best method of attachment for lacing these teeth to the expansion arch C. The rotation of the right lateral is accomplished by making a band of the heavy band metal J with a short spur soldered on the mesio lingual angle. This spur engages the wire ligature and brings all the force on the mesial side of the tooth. This is re-enforced by a rubber wedge tightly drawn between the expansion arch C and the disto labial angle of the tooth. A sharp downward bend on each side of the expansion arch C in the cuspid region greatly increases the pressure on the cuspid teeth by the torsional stress that is brought to bear.



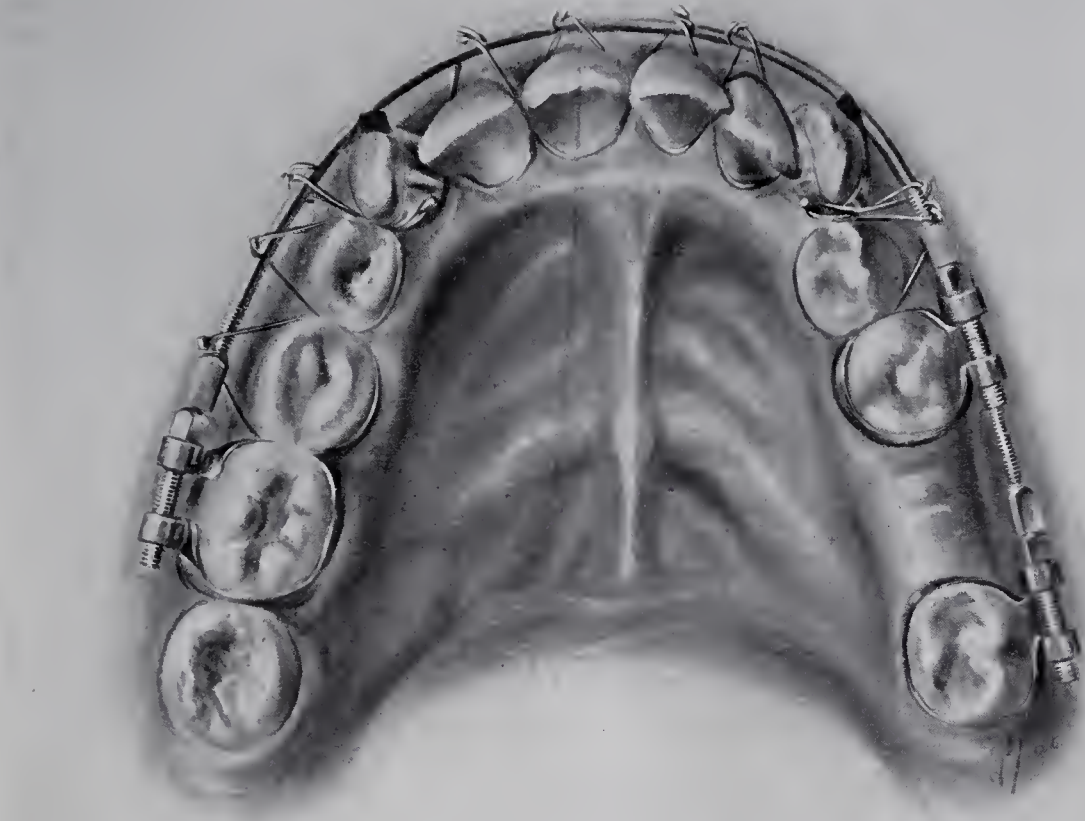


FIG. 21

Fig. 21 illustrates a method of re-enforcing the molar anchorage in a case where a first lower molar is missing. Molar anchor bands K are placed on the left first molar and the right second molar; also a bicuspid anchor band M on the second right bicuspid. The expansion arch C is then bent to closely fit the dental arch and allow its insertion into the hollow clamping bolts of these anchor bands. The nut on the right side of the arch is then carried as far forward as the threading will permit. After the end of the arch passes through the hollow clamping bolt of the bicuspid anchor band M, a second nut is placed on the end of the arch and carried forward sufficiently far to allow the end of the arch to enter the clamping bolt of the molar anchor band K, while the left side of the arch enters the anchor band in the usual manner. The expansion of the dental arch and rotation of the cuspids is accomplished as shown in the illustration, and previously described.



FIG. 22

Fig. 22 illustrates a method of applying the intermaxillary force for shifting the teeth upon themselves from a distal to a normal position. An anchor band K is placed on the first lower molar and a bicuspid anchor band M on the first upper bicuspid. A rubber band is then placed over the distal end of the clamping bolt on the molar and over the mesial end of the clamping bolt on the bicuspid as shown in the illustration. It is essential that this force be very constant in its application until the teeth have moved over the crest of the cusps of the opposing teeth, when the tendency is for them to settle into their normal relation.

#### APPLICATION OF JACK SCREW

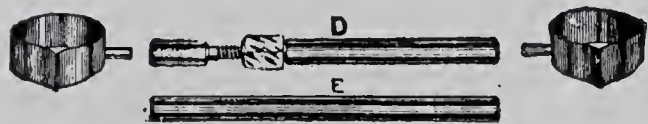


FIG. 23

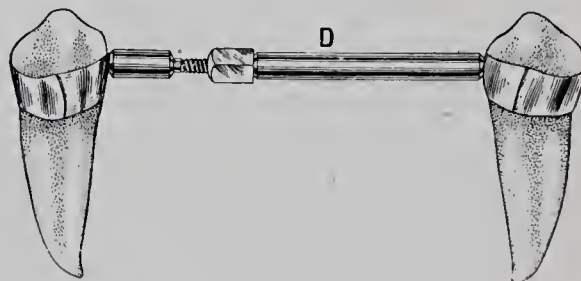


FIG. 24

Fig. 23 shows the double tubular end jack screw D and E; the long sheath E is for use where it is necessary to span a greater space than can be covered with the short sheath.

Fig. 24 shows the jack screw D in its relation to bands made of the heavy band material J to which have been soldered spurs of the spur wire A, which engage the double tubular ends of the jack screw D and prevents its being easily dislodged by the tongue or otherwise.



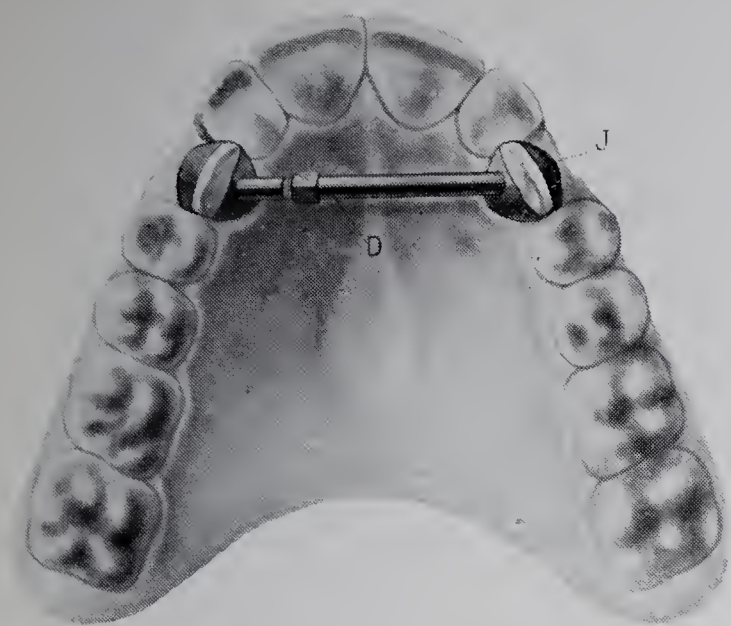


FIG. 25



FIG. 26

Fig. 25 shows the jack screw D in place for the purpose of carrying two inlocked cuspid teeth into their proper alignment. Bands are first made of the heavy band material J to fit each of the cuspids; on the lingual surface of each is soldered a short spur of the spur wire A at right angles to the long axis of the teeth; then place the jack screw D in position by placing the double tubular ends over the spurs A.

Fig. 26 shows the corrected case.



FIG. 27

Fig. 27 illustrates a combination of the molar clamp band K and the jack screw D to accomplish the rotation of a first superior bicuspid where the deciduous second molars were still in position. A band is made of the heavy band metal J to fit the bicuspid to which are soldered spurs as indicated. A molar anchor band K is then placed on the first permanent molar with a spur soldered to its mesio lingual angle and the tubular end of the jack screw D flattened and notched to engage the spur on the buccal surface of the bicuspid band and placed in the hollow clamping bolt of the anchor band K with the nut of the jack screw resting against the mesial end of the clamping bolt. A heavy rubber ligature engaging the spurs on the lingual surface of the bicuspid and molar bands assists in bringing the bicuspid in to the line of occlusion when pressure is brought to bear on the buccal surface by tightening the nut of the jack screw against the mesial end of the clamping bolts of the anchor band K.



## COMBINATIONS FOR THE REDUCTION OF SPACE BETWEEN THE CENTRAL INCISORS

Spaces of varying width between the superior central incisors is a condition of frequent occurrence; the result of various causes chief of which is the excessive development and low attachment of the frenum labi. Its removal by cauterization and prolonged retention of the teeth is absolutely essential to any degree of success in the correction of this condition.



FIG. 28

Fig 28 shows a method of moving the central incisors together in cases where the operator is in perfect control of the patient and can tighten or replace the ligatures about every second day, during a longer interval of time the ligature is liable to displacement. Bands are first made of the heavy band metal J to perfectly fit each of the central incisors; on the mesio labial angle of each band is soldered a short spur of the spur wire A. These spurs should have a slight distal inclination to better retain the ligature in position. The bands are then cemented firmly in place. This should be accomplished prior to the removal of the frenum by cauterization or other surgical removal, and the Fig. 8 ligature of elastic bronze wire 28 gauge applied at the same sitting.



FIG. 29

Fig. 29 illustrates a method of reducing this space by means of an anchor band K. This will be found a very efficient method of reduction in cases of slight separation.

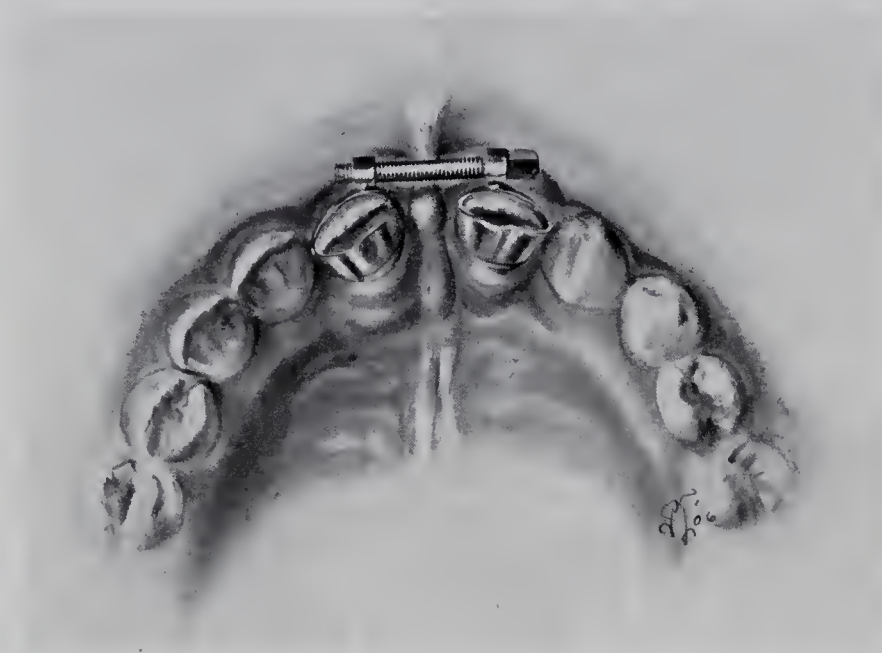


FIG. 30

Fig. 30 shows a most efficient method of carrying the central incisors together in cases where the separation is very marked. Bands of the heavy band metal J are made to fit each of the central incisors. The smooth bore and threaded eyelets of the molar anchor band K are then detached by holding them over the flame of the blow-pipe and resolder to the mesio labial angle of the plain bands. The clamping bolt is then placed in position as shown in the illustration. This makes a very positive appliance and one that can be readily operated by the patient.



## COMBINATIONS FOR SECURING FIXATION IN CASES OF FRACTURED MANDIBLE

Fig. 31 shows a method of fixation in a case where the fracture extends through the ramus just above the angle of the mandible. An anchor band K is adjusted to the lower first molar and a bicuspid band M to the first upper bicuspid, and both firmly cemented in position. This places the bands in such relation to each other that when the 26 gauge wire ligature is placed through the hollow clamping bolts, and pressure brought to bear on this ligature by twisting, the tendency is to carry the mandible up and



FIG. 31

forward until the teeth are in correct occlusion. This interlocking of the cusps greatly assists in retaining the anterior fragment in position. A material advantage is gained by placing the ligature through the long hollow clamping bolts of the bands, as a greater and more even distribution of force is secured than where spurs are used for the attachment of the ligatures. In case of bi-lateral fracture of the rami, this combination placed on each side affords a most efficient method of fixation.



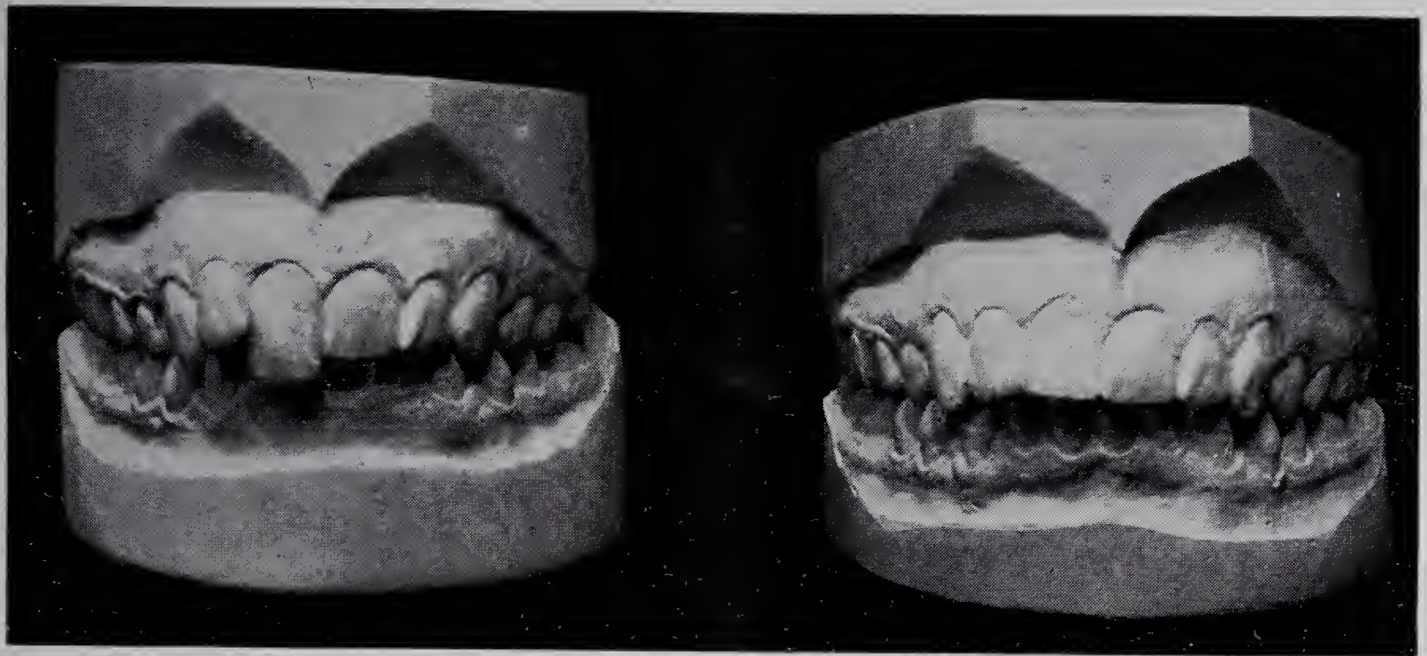
FIG. 32

Fig. 32 shows a very common fracture of the mandible extending through the body of the bone between the first molar and second bicuspid involving the mental foramen. The combination of appliances shown in the illustration is a most satisfactory method of holding the parts in position. A molar anchor band K is placed on the first molar and a bicuspid band M on the cuspid; a short section of the arch C is then placed through the hollow clamping bolts of the bands with the nuts placed in such position that they bear against the mesial end of the clamping bolt of the cuspid band and the distal end of the molar band. This holds the parts in perfect position and allows the patient the free movement of the mandible.



## A FEW CASES CORRECTED WITH LUKENS APPLIANCES

FIG. 33



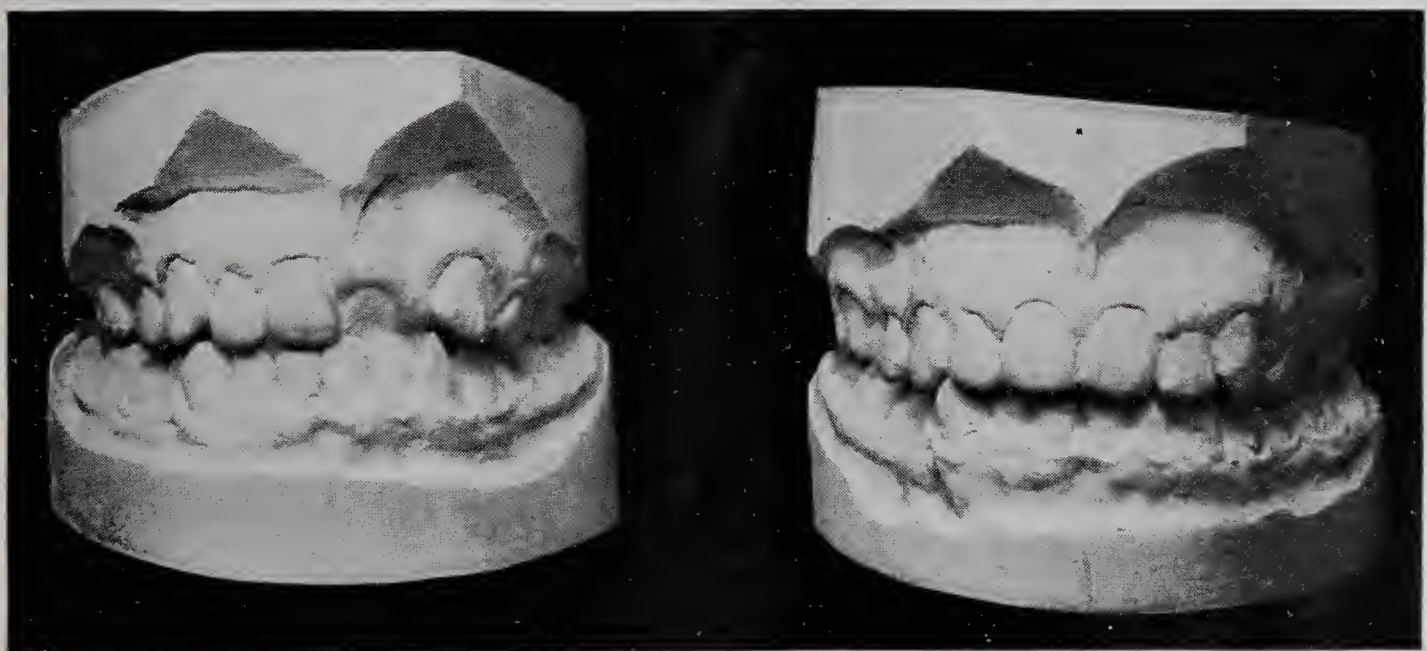
No. 1

No. 2

Fig. 33, No. 1, illustrates a very interesting case of excessive development of the right central incisor in the mouth of a patient fifteen years of age. This tooth was much wider mesio-distally than its companion, and was a full third longer from the gingival line to the incisal edge, with the right lateral lapping well over its disto-labial surface.

Both arches were expanded by means of the expansion arch C, and after being brought into harmonious relation with each other, the right central was ground to conform in size and shape to the left central, No. 2.

FIG. 34



No. 3

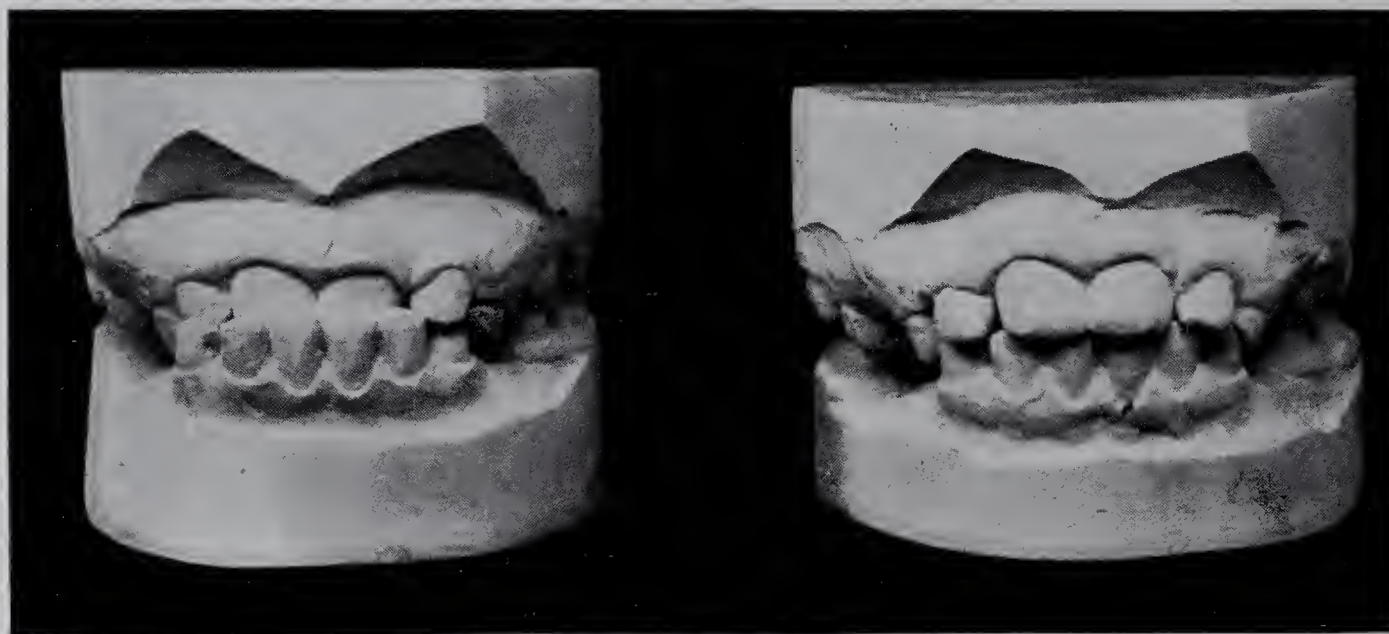
No. 4

Fig. 34, No. 3, shows a case with the left central and lateral inlocked to a very marked degree. This case was corrected by



expanding both arches, using the expansion arch C in combination with the anchor bands K. No. 4 shows the corrected case.

FIG. 35



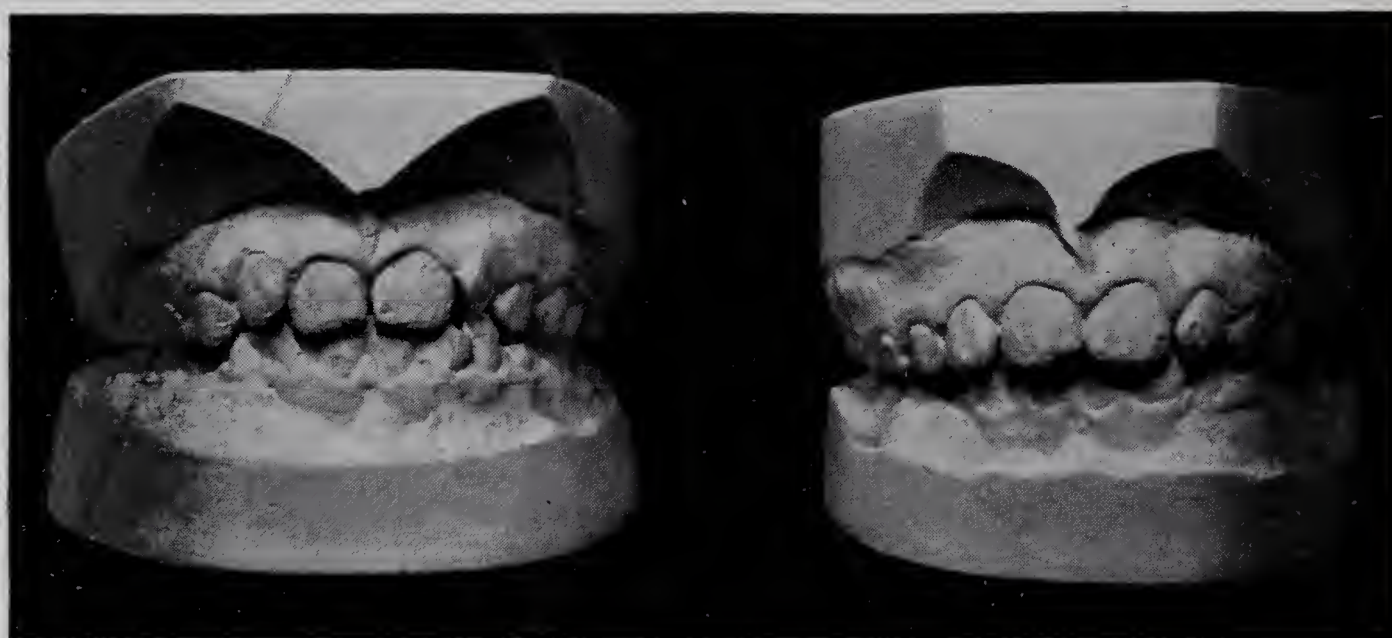
No. 5

No. 6

Fig. 35, No. 5, illustrates a case where the upper incisors were occluding to the lingual of the lowers, in a patient nine years of age.

No. 6 shows the case after they were carried forward to their correct positions by means of the expansion arch C.

FIG. 36



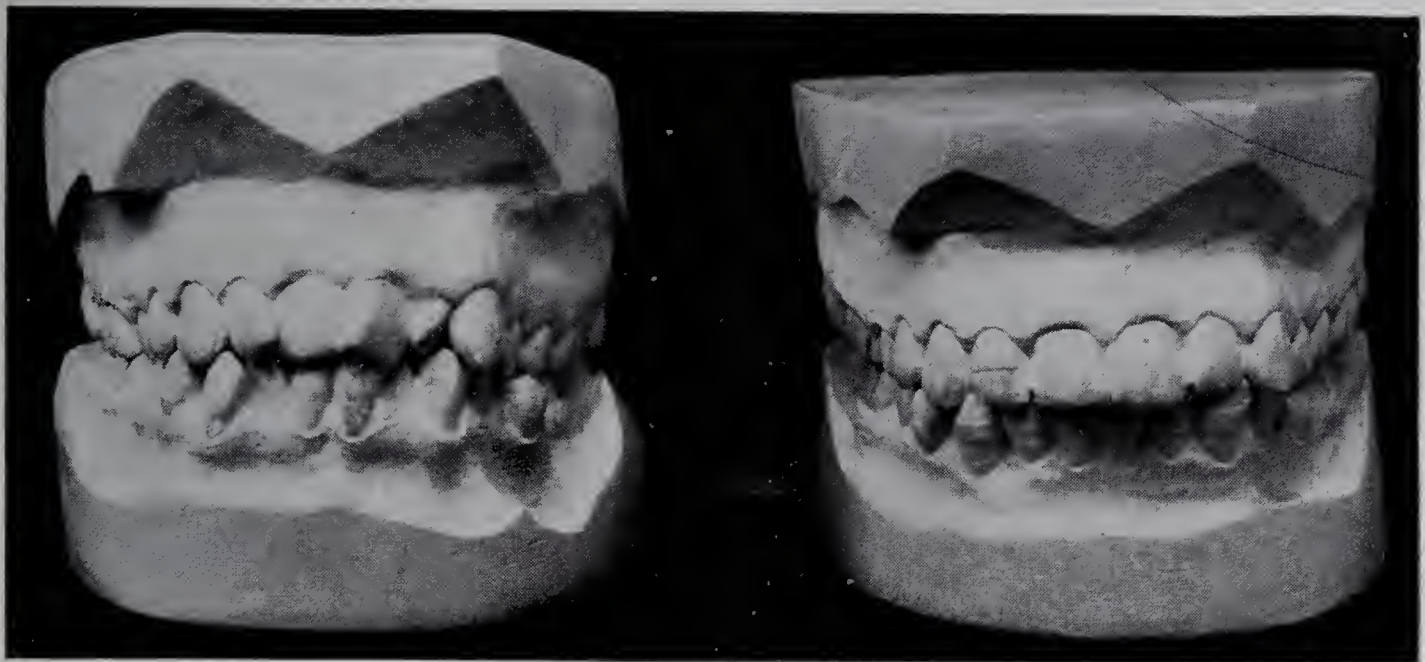
No. 7

No. 8

Fig. 36, No. 7, shows a case at nine years of age where it was necessary to slightly expand both arches with the expansion arch C to provide space to rotate the incoming upper lateral incisors into their correct position, as shown in No. 8.



FIG. 37



No. 9

No. 10

Fig. 37, No. 9, illustrates a case where both arches were expanded to their full size by means of the expansion arch C, as shown in No. 10.

FIG. 38



No. 11

No. 12

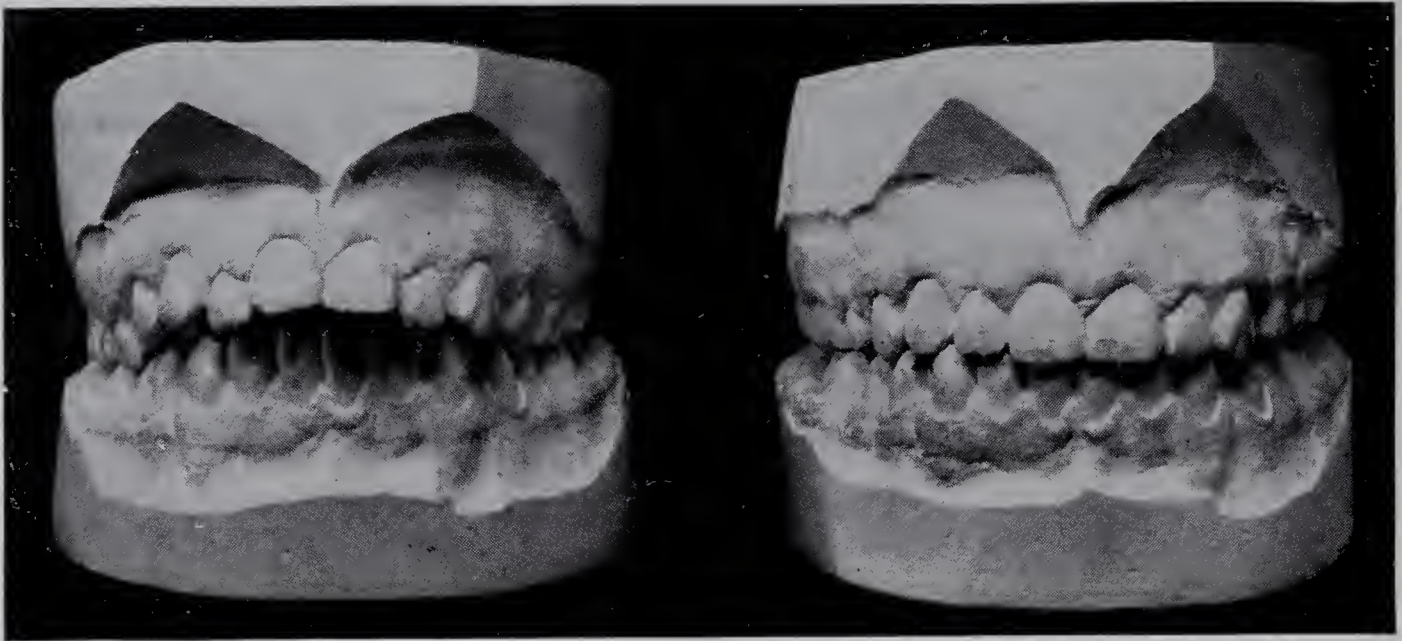
Fig. 38, No. 11, shows another case where the expansion of both arches was necessary in order to provide space for all the teeth.

This case shows the great amount of expansion that can be accomplished with the expansion arch C in combination with the anchor bands K.

No. 12 shows the case corrected.



FIG. 39

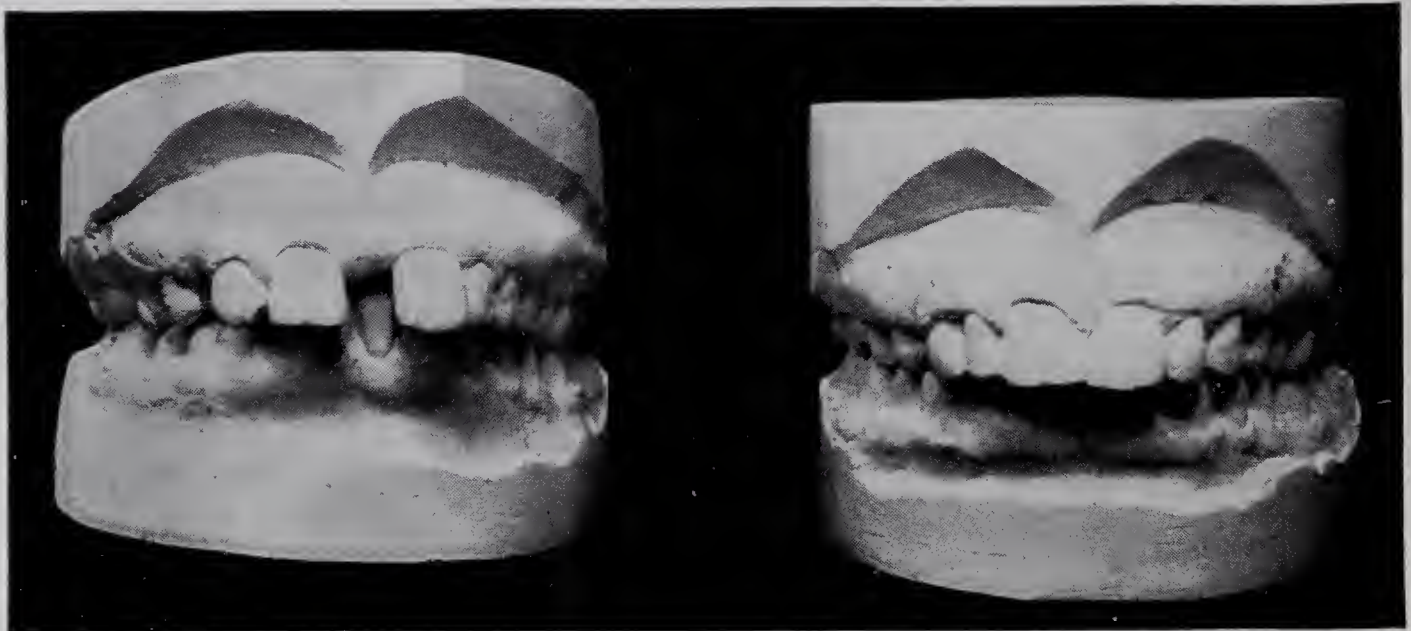


No. 13

No. 14

Fig. 39, No. 13, illustrates a case of anterior protrusion due to lip biting, and corrected by using the expansion arch as illustrated in Fig. 16. No. 14 shows finished case.

FIG. 40



No. 15

No. 16

Fig. 40, No. 15, illustrates a case of most marked separation of the upper central incisors in a patient twenty-three years of age. The lateral incisor on the right side was missing, and the cuspid in contact with the central. Plain bands were made of the band material J for each of the central incisors, on the mesio-labial angle of which was soldered short spurs of the spur wire A and the centrals brought together by a figure eight ligature reaching from one spur to the other, which was replaced every second day; the cuspid was carried back by means of the retracting screw F; this provided space for the introduction of an artificial lateral incisor, as shown in No. 16.



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